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Mark Scheme (Results)

June 2011

GCE Music Technology (6MT04)
Paper 01 Analysing and Producing

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Section A

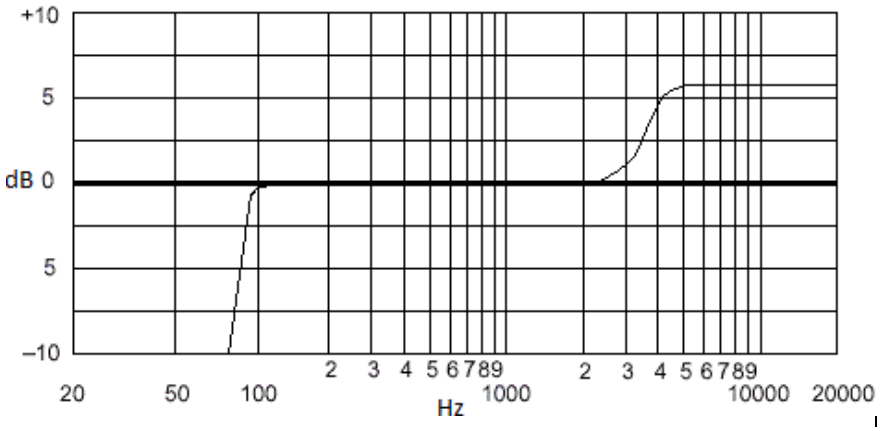
Question Number	Question	Mark
1(a)	(a) Which term best describes the playing technique of the pad from bars 7-17? Put a cross in the correct box:	**1**
	Acceptable Answers	
	Staccato	

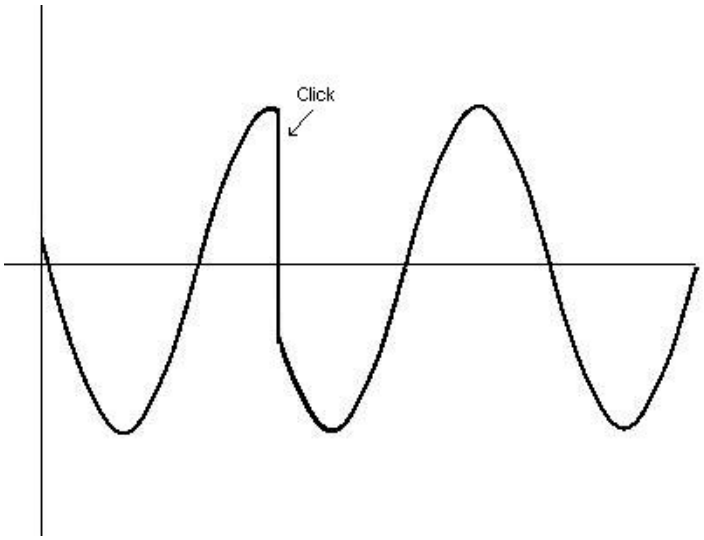
Question Number	Question	Mark
1(b)	Complete the table below. Referring to the chord symbols, identify the notes in each chord in the verse. An example is given for the first chord in the verse.	**4**
	Acceptable Answers	

Chord	**Notes of chord**	N.B.
G	G B D (1)	in any order **(1)**
C	C E G (1)	in any order **(1)**
A^7	A C# E (1) A C# E G (2)	Give 1 mark if triad is correct with incorrect extension note. If triad is incorrect, award 0. **(2)**

Question Number	Question	Mark
1(c)	Describe how subtractive synthesis has been used to shape the synth pad timbre in **bars 2-5**.	**4**
	Acceptable Answers	
	An ADSR/EG/envelope/automation/real time MIDI controller (1) is used to shape the low pass (1) filter/DCF/VCF (1). Short/fast attack time (1) and a long/slow decay (1). The cutoff (1) frequency decreases/ filter closes (1) removing high frequencies / harmonics / partials (1) gradually throughout each note (1). Any mention of: CC74/brightness (1) Any mention of: Resonance/peak/Q/emphasis (1) The amplitude envelope has a short/fast attack (1), maximum sustain (1) and a short/fast release (1).	

Question Number	Question	Mark
1(d)	Between bars 7-24 there are two rhythmic errors in the snare drum notation. An example of a rhythm error is given in bar 2. Identify two rhythmic errors in the snare drum notation. Circle the entire bar. Notate the correct rhythm for the entire bar on the blank stave.	**4**
	Acceptable Answers	
	One mark for each rhythm circled; 1 mark for each correct rhythm written. The entire bar's rhythm must be accurate. If bar is not circled but **correct** rhythm is notated above then award 1.	

Question Number	Question	Mark
2(a)	(a) The vocal part has been compressed and equalised. Using the graph below, illustrate the EQ applied to the vocal part. (i) Label the two axes. (ii) Draw the rumble filter. (iii) Draw the high frequency boost that has been used to bring the vocals forward in the mix.	**8**
	Acceptable Answers	
	(i) Frequency/Hertz/Hz (1) Amplitude/magnitude/volume/dB/gain (1) (ii) Starts on x-axis 50-150 Hz (1) cuts to –oo (1) steep, not vertical curve (don't allow shelving EQ) *that should fit in two vertical graph divisions AND hit -oo* (1) -1 for any additional +ve bump less than 2000Hz (iii) Mid point of slope 2000Hz and 7000Hz. *If there are multiple bands, take the slope of the lowest band above 2kHz.* (1) Gentle high shelving curve. (1) *Allow any curve made up from multiple bands as long as peaks and troughs do not don't exceed the 2.5dB - 7.5dB range*. Boosts between 2.5-7.5dB at peak (1) -1 for any additional cuts below 0dB  	

Question Number	Question	Mark
2(b)	When joining two sections of audio together, a click is often heard. Explain what causes this click either in writing or as a labelled diagram.	**2**
	Acceptable Answers	
	There is a vertical line in the waveform joining the two sections of audio (2) The audio is not split/joined at a zero crossing point (2) The waveform is discontinuous (2) There is a jump in voltage/displacement in the waveform (2) Allow any diagrammatic representation (that includes a vertical displacement) e.g.  (2) Award 1 mark for a more vague answer like: The levels don't match where the two pieces join. (1) The waveforms don't match up (1) The edit has been made in an inappropriate place (1)	

Question Number	Question	Mark
2(c)	Identify and describe **two** different techniques for preventing a click when joining two sections of audio together using music production software.	**2+2**
	Acceptable Answers	
	X-fade / Crossfade (1) is where one audio file fades quickly into the other / is where one audio file fades out as the subsequent one fades in (1). Allow (1) for references to type or shape of crossfade, eg equal power, equal gain, s-curve or diagram. Using a short fade out at the end of the first section and quick fade in for the second section (1) if the edit point is during a silence/between notes (1). *Note, the second point must be mentioned to score the first otherwise a drop-out would be heard.* Zero-crossing (detection) (1) cuts audio where the waveform crosses the x-axis / 0 displacement (1) Carefully selected edit point just before the attack transient/during a silence / between musical phrases (1) Using the pencil tool to redraw the waveform (2). Give a mark for each term and another mark for any correct explanation.	

Question Number	Question	Mark
2(d)	Using appropriate production and editing tools, replace the noisy end section of "vocal main.wav" with the corresponding section of "vocal end.wav".	**4**
	Acceptable Answers	
	Listen to the final phrase "love confirmed, oooh". The edit point will be +/- 1s of the "f" in "confirmed".	

Mark	Preparation of vocal track — Removing unwanted noises
4	Excellent – carefully edited vocal, no edit point can be heard
3	Good – the edit is in time, but can be heard as a slight click, glitch or phasing.
2	Inconsistent – the edit is in time, but can be heard as an intrusive click or glitch that would be heard in a mix.
1	Poor – the edit is more than a semi-quaver out of time and/or unmusical.
0	No attempt at editing - the noise on the vocal is still audible.
	If the vocal is not soloed, or metronome is switched on, then assess what can be heard clearly up to max 2.

<table>
<tr><th>Question Number</th><th>Question</th><th>Mark</th></tr>
<tr><td>3(a)</td><td>Import “bass example.wav” from the CD ROM to a new mono audio track in your music production software. This track is bar 1 of the bass to illustrate how the bass should sound. You should not use this audio in your final mix.
(a) Create a bass sound that matches the timbre and octave used in “bass example.wav”.
• Use a saw wave mixed with a square wave an octave below.
• There should be no filtering.
• Copy the envelope used in the example.
Acceptable Answers
<table><tr><th>Bass timbre</th></tr><tr><td>Synth timbre used (1)</td></tr><tr><td>Suitable octave for both waveforms (1)</td></tr><tr><td>Geometric waveforms with high harmonic content (1)</td></tr><tr><td>No obvious filtering (1)</td></tr><tr><td>Suitable envelope is used and no glide / portamento (1) Consider filter and amplitude envelopes.</td></tr><tr><td>Award 0 if no synth bass timbre used</td></tr><tr><td>If the bass is not soloed or the metronome is switched on, assess what can be heard clearly.</td></tr></table></td><td>5</td></tr>
</table>

<table>
<tr><th>Question Number</th><th>Question</th><th>Mark</th></tr>
<tr><td>3(b)(i)</td><td>In bar 6 of the bass track, a MIDI controller is used to add musical expression to the performance. Describe the controller in the table below.
Acceptable Answers
<table><tr><th>MIDI Controller Number</th><th>MIDI Controller Name</th><th>Highest value reached in bar 6</th></tr><tr><td>1 (1)</td><td>Modulation (1)</td><td>127 (1)</td></tr></table></td><td>3</td></tr>
</table>

<table>
<tr><th>Question Number</th><th>Question</th><th>Mark</th></tr>
<tr><td>3(c)</td><td>In bar 13 of the bass track, the note lengths are inappropriately short. Edit the notes so that they match the articulation of the previous bar.
Acceptable Answers
Listen to 0:24-0:29 (or an equivalent location for candidate responses with more/less silence at the start of the CD track).
<table>
<tr><th>Mark</th><th>Correcting note lengths</th></tr>
<tr><td>2</td><td>Good – bar 13 has the same note length as the previous bar on the exam CD</td></tr>
<tr><td>1</td><td>Poor – one or more of the notes are too short or are longer than the original previous bar
OR
slight timing errors introduced</td></tr>
<tr><td>0</td><td>The MIDI file has not been altered
OR
Serious timing errors
OR
Notes completely deleted</td></tr>
<tr><td></td><td>If the bass is not soloed then assess what you can hear clearly up to max 1.
If metronome is switched on with soloed bass then assess what can be heard clearly up to max 2.</td></tr>
</table></td><td>2</td></tr>
</table>

Question Number	Question	Mark
3(d)	From bar 20 onwards, the bass plays out of tune. Explain why. Acceptable Answers Pitchbend (1) bends up / value of 50/114/6401/14593/78% (1) does not reset to 0/centre/release pitchbend wheel/stays up until end of bar 23 (1)	**3**

<table>
<tr><th>Question Number</th><th>Question</th><th>Mark</th></tr>
<tr><td>3(e)</td><td>Correct the MIDI programming error to ensure that the bass plays in tune throughout.
Acceptable Answers
Listen to the whole bass part. Check the chorus from 0:41 (or an equivalent location for candidate responses with more/less silence at the start of the CD track).
<table>
<tr><th>Mark</th><th>Correcting pitchbend error</th></tr>
<tr><td>2</td><td>Good – the pitches have been corrected</td></tr>
<tr><td>1</td><td>Adequate – most of the pitches have been corrected</td></tr>
<tr><td>0</td><td>The MIDI file has not been altered / additional errors have been introduced.</td></tr>
<tr><td></td><td>If the bass is not soloed then assess what you can hear clearly up to max 1.
If metronome is switched on with soloed bass then assess what can be heard clearly up to max 2.</td></tr>
</table></td><td>2</td></tr>
</table>

Question Number	Question	Mark
4(a)	Reverberation has been used to enhance music since the birth of recording. Describe the different techniques and technologies that have been used to apply reverberation to recordings from the 1920's to the present day.	**16**
	Acceptable Answers	
	Accept any description of reverb (max.1) Reverb is added to recordings that have been made using close-mic techniques (1) or recordings that have been made in anechoic chambers / dry spaces (1). This is so that reverb levels can be controlled by an engineer or performer (1). Reverb is an auxiliary effect (1). Reverb time / RT60 (1) Reverb is often found in guitar amplifiers / FX pedals / synth in-built FX (1). Reverb can be a dedicated hardware / rackmount unit (1). Reverb can be added with a software plug-in (1). **Natural reverberation** (1) Captured using ambient mic'ing (1) techniques. More reverb is captured if a microphone is further away (1). Omni (1) or fig-8 (1) microphones pick up more reverb than cardioids. Ambient mic's are added to close mic'ed signals and blended together (1). Award for suitable example of ambient mic'ing (1), eg spaced omnis, A-B pair, co-incident pair, X-Y pair, ORTF, M-S, Blumlein stereo, Decca tree, binaural, Sound field, PZM, boundary. Room acoustics determine the nature of the reverb (1) **Echo chambers** (1) Up until the 1950's (1) reverb was made by playing a dry signal in a room (1). This was achieved by placing a loudspeaker at one end of a room (1) and an omni-directional (1) microphone at the other (1). The height and angle of the microphones affect the amount of reverb (1). The room would be constructed from reflective material like stone or concrete to increase the amount of reverb (1). The room needs to be sound-proof to prevent noise from getting in (1). The signal from this microphone would then be added to the dry mix (1). Often this reverb is controlled in the mix with a keyed gate (1). Some studios used garages or stairwells (1) **Plate reverb** (1) In 1950's (1), the EMT 140 Reverberation Unit (1) was released. Though a plate reverb unit is large, it is smaller than a dedicated echo chamber (1). It was very expensive (1). The unit consists of a large metal sheet (1). The sound is input by a speaker-like transducer attached to the sheet (1), causing the sheet to vibrate (1). The reflections from the edge of the sheet are picked-up by microphone-like transducers (1). Two microphone-like transducers are used for stereo (1). The reverb time is controlled by a damping pad (1) which is used to absorb the reflections more quickly (1). Plate reverbs give a very dense reverb (1). Even today, plate reverbs	

	are often used on vocals (1). Max 1 for any discussion about materials and dimensions of the plate affecting tone. **Spring reverb** (1) Also developed in the 1950's (1). The spring reverb works in a similar fashion to the plate reverb (1) except a spring is used instead of a metal sheet. The main advantage of the spring reverb is that it's a lot smaller (1). Spring reverb has a characteristic twangy sound (1). When a spring reverb is knocked it creates a thundering sound (1). Spring reverbs tend to have a mid-range boost (1) and a long reverb time (1). The reverb time can be adjusted by the tension of the spring (1). **Digital reverb** (1) Digital reverb appeared in recording studios in the 1980's (1). Yamaha (1) and Lexicon (1) were the pioneer manufacturers. A signal is input into a computer algorithm (1) which consists of many delays /echos (1) with feedback (1) and filtering (1) which emulate the reverb characteristics of real spaces (1). The main advantage of digital reverb is that the character of the reverb can be easily changed by adjusting parameters on-screen (1), or even via MIDI (1). Award max (1) for naming a parameter in addition to reverb time. Also the early reflections are more prominent than plate or spring reverbs (1) so they sound more realistic (1). Digital reverb is very heavy on the CPU (1). As CPUs got quicker, the realism of the reverb improved (1). In the late 1990's (1) digital reverbs became software plug-ins in sequencing packages. **Convolution/Sampling reverb** (1) Convolution reverb became a reality with increased processing power (1). It appeared in studios in the 2000's (1). Sony pioneered this type of reverb (1). Convolution reverb takes a sample of the reverb of a space (1) called an impulse response (1). This is created by emitting an excitation/stimulus into the room (1). Such signals include a sine sweep/balloon pop/gun shoot (1). Frequently, the excitation signal must later be de-convolved from the impulse response (1) or cut from the start of the impulse response (1). It is then convolved with the dry signal to produce the reverb. It allows a sound to be placed in a specific venue without having to actually visit it (1), or to recreate specific hardware units (1). Award an example of a plug-in eg Space Designer (1).	

Question Number	Question	Mark
4(b)	Microphones have been used since the late 1800's to record sound. Describe what a microphone does. Explain how a dynamic microphone and a condenser microphone function and identify the benefits of each type.	**16**
	Acceptable Answers	
	Description of a microphone A microphone is a transducer (1) that converts sound energy into electrical energy (1). The sensitive transducer element of a microphone is called its *element* or *capsule* (1). The signal needs a pre-amp (1) to convert it to a workable (line) level/impedance (1). Any discussion of polar response, e.g. omni / cardioids. Credit accurate diagrams. Max 1. **Dynamic microphone** Dynamic microphones are sometimes called <u>moving coil</u> microphones (1). Dynamic microphones function in the same way as a loud speaker, only reversed (1). A movable <u>coil</u> (1) which is <u>positioned in a magnetic field</u> (1) is attached to the <u>diaphragm</u> (1). When sound enters the microphone the membrane / diaphragm vibrates (1). Consequently, the coil moves in the magnetic field and a <u>varying</u> (1) electrical current is induced (1) in the coil, in line with the rising/falling air pressure (1). This process is called <u>electromagnetic induction</u> (1). **Benefits of dynamic microphones** Generally inexpensive (1) Robust (1) Can withstand high SPL (allow volume) (1) Resistant to moisture (1) Lack of sensitivity reduces feedback (1) Good for live use (1) Does not require (phantom) power (1). Limited HF response makes them suitable for bass instruments (1) Slow transient response introduces a form of acoustic compression (1) **Condenser microphone** The diaphragm (1) (don't award diaphragm buzzword twice if mentioned for dynamic microphone) forms one (1) <u>plate</u> (1) of a <u>capacitor</u> (1). When the diaphragm vibrates, the distance of the plates changes (1) thus changing the capacitance (1). From this a <u>varying voltage</u> (1) is produced. Phantom power (1) 48V (1) is required to <u>charge the capacitor</u> (1). Some condenser microphones can be powered by a battery (1). Polar response / pick-up pattern switch (1) that selects between different / combinations of capsules (1). Some microphones have interchangeable capsules (1). Power switch (1). Pad switch (1) usually -10 dB (1)	

	High pass filter (1) to eliminate rumble/low frequencies (1) Usually has cradle/shock mount (1) **Benefits of condenser microphones** Sensitive / pick up quiet sounds (1) Flat frequency response (1) Good high frequency response / wide frequency range / brighter than dynamics (1) Good signal to noise ratio / low noise / wide dynamic range (1) Fast transient response (1)	

In the case that a student has answered both questions, mark both and take the highest mark, unless one response is crossed out.

14 – 16	An excellent response. Substantial and thorough with a perceptive and accurate commentary on the main points of the detailed assessment criteria. The response will be coherent in terms of structure. There will be an excellent understanding of technical issues. QWC: Very few syntactical and/or spelling errors may be found but these will not detract from the overall coherence. Excellent organisation and planning. All the skills required to produce convincing writing are in place.
10 – 13	A good response. Detailed and accurate commentary on the main points of the detailed assessment criteria. The response will be coherent on the whole and a good understanding of technical issues is shown. QWC: Few syntactical and/or spelling errors may be found but these will not detract from the overall coherence. Good organisation and planning. Almost all of the skills required to produce convincing writing are in place.
6 - 9	An acceptable response. There may be limited detail, but reference has been made to most of the main points in the detailed assessment criteria. The response will have some coherence, but may lack a sense of understanding of technical issues at times. QWC: Some syntactical and/or spelling errors may be found but overall the writing is coherent. Some organisation and clarity. Most of the skills needed to produce convincing writing are in place.
2 - 5	A limited response. Mention has been made of some of the main points on the detailed assessment criteria, but little reason has been given for them. The response will have limited coherence and little understanding of technical issues. QWC: Some syntactical and/or spelling errors are present. The writing will display some degree of organisation and clarity but this will not be sustained throughout the response. Some of the skills needed to produce convincing writing are in place.
1	A poor response with little reference to any relevant technologies. QWC: Frequent syntactical and/or spelling errors are present. The writing contains passages which lack clarity and organisation. A few of the skills needed to produce convincing writing are present.

TOTAL FOR SECTION A: 62 MARKS

Section B

5 You should now have the following tracks imported on the computer:
synth pad, drums, vocal and bass.

Produce a final balanced stereo mix with the following features:

Question Number	Question	Mark
5(a)	(a) In the verse, some of the chords have been recorded 5dB quieter. Apply a gate to the synth pad track. • Some of the chords should be removed by the gate. • The rhythm of the chords will change. • The synth pad part will gradually build through the verse. • Ensure that there are no false triggers of the gate.	**3**

Acceptable Answers

	Management & controlling gating of the synth pad
3	Excellent control so that the quieter chords are gated out and the rhythm gradually increases throughout the verse.
2	The rhythm is correct, but there are audible false triggers on the gate.
1	Poorly handled so that there are intrusive gating errors such as notes cut off, incorrect rhythm.
0	There is no audible evidence of gating on the synth pad track. No mix present on CD.

<table>
<tr><th>Question Number</th><th>Question</th><th>Mark</th></tr>
<tr><td>5(b)</td><td>Apply an automated filter to the bass part.
Only bars 7-19 should be affected.
Use a low pass filter with a steep roll-off.
The cut-off frequency should be set low in bar 7, but the bass must still be clearly audible.
Gradually increase the cut-off frequency so that the effect continues to build until bar 19.
Acceptable Answers<table><tr><th></th><th>Management & control of bass filtering</th></tr><tr><td>3</td><td>Excellent control so that the cut off frequency of a low pass filter smoothly rises throughout the verse. The remainder of the bass part is unaffected. There is no audible join between the verse and the chorus.</td></tr><tr><td>2</td><td>A variable low pass filter or low-shelving EQ is used to create some sense of crescendo. The remainder of the bass part is unaffected. There might be an audible join between the verse and the chorus.</td></tr><tr><td>1</td><td>A jerky or static low pass filter or low-shelving EQ is used that creates a noticeable contrast with the chorus.
OR
The remainder of the bass part is affected by the filtering.
OR
Other parts as well as the bass are filtered, e.g. the candidate has filtered the pad as well as the bass.</td></tr><tr><td>0</td><td>There is no clearly audible low pass filtering or low-shelving EQ on the bass track.
OR
No mix present on CD.</td></tr></table></td><td>3</td></tr>
</table>

Question Number	Question	Mark
5(c)	Apply panning to the snare fill in the **drum part.** • Only **bar 19** should be affected; all other bars should be panned to the centre. • The snare hits on beat 2 should be panned hard left. • The snare hits on beat 3 should be panned hard right. • The snare hits on beat 4 should be panned to the centre. Acceptable Answers **Management & control of panning automation on the drums** 3 – Excellent panning automation with the snare panning from left to right as directed 2 – Competent panning automation with the snare panning across the stereo field in some way but perhaps some hits not panned correctly 1 – Poorly managed panning automation with the snare panned to one position other than centre in bar 19 OR Erratic panning OR the drums do not reset to centre from bar 20 0 – There is no panning automation used in bar 19. No mix present on CD. If any track other than the drums is panned significantly off centre then max 1.	

Question Number	Question	Mark
5(d)	Apply reverb to **each** of the four tracks. • Use a 1.5 second reverb time. • The reverb should not be intrusive. • The vocals should have the most reverb, and the accompaniment slightly less. Acceptable Answers **Application of reverb** 3 – Excellent use of reverb on **all** tracks. The vocal has the most reverb. 2 – Competent use of reverb with some misjudgements. 1 – Serious misjudgement on 1 track or more. OR Wrong effect added on any track. 0 – No evidence of reverb being applied to any track. OR No mix present on CD.	**3**

<table>
<tr><th>Question Number</th><th>Question</th><th>Mark</th></tr>
<tr><td>5(e)</td><td>(e) Balance the mix.
• The balance should suit the style of the music.
• Ensure that all of the tracks can be heard clearly.
Acceptable Answers
<table><tr><td></td><td>Balance and blend</td></tr><tr><td>3</td><td>Consistently well balanced so that all tracks can be heard clearly.</td></tr><tr><td>2</td><td>Most tracks are well balanced. A few misjudgements. For example, one track may be beginning to mask another.</td></tr><tr><td>1</td><td>Poorly balanced, detrimental to the musical outcome.
OR
The metronome has not been turned off.</td></tr><tr><td>0</td><td>Not all tracks present/additional tracks (including bass example).
OR
No mix on CD.</td></tr><tr><td></td><td>-1 If the final phrase of vocal is missing due to poor edit</td></tr></table></td><td>3</td></tr>
</table>

<table>
<tr><th>Question Number</th><th>Question</th><th>Mark</th></tr>
<tr><td>5(f)</td><td>Produce a final stereo mix.
Ensure that the mix output is at as high a level as possible.
• It should be free from distortion.
• Do not limit or compress the mix output.
• Ensure that the beginning of the music and reverb tail of the mix are not cut off.
• Ensure that silences at the beginning and end do not exceed one second.
Acceptable Answers
<table><tr><td></td><td>Presentation of mix</td></tr><tr><td>3</td><td>Beginning and end of mix does not cut out music or reverb tail. The beginning AND end should have less than 1 second of silence. The mix output should be near normalised with no distortion.</td></tr><tr><td>2</td><td>Beginning and end of mix does not cut out music or reverb tail. The beginning AND/OR end has a silence greater than 1 second
OR
The mix output is too low OR is compressed.</td></tr><tr><td>1</td><td>Obviously chopped start or ending.
OR
Any part is noticeably out of sync
OR
The mix output is unacceptably low or too high (distorted).
OR
Excessive use of mix compression causes pumping
OR
“bass example.wav” has been used instead of “bass.mid”</td></tr><tr><td>0</td><td>No mix present on CD.</td></tr></table></td><td>3</td></tr>
</table>

(Total 18 marks)
TOTAL FOR SECTION B: 18 MARKS
PAPER TOTAL 80 MARKS

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